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ABSTRACT

This study investigated the mental health needs of New York City (NYC) public school students 6 months after the September 11, 2001 attack. A needs assessment survey was conducted on 8,266 students in grades 4-12 from 94 schools in the Ground Zero area, other presumed high risk areas, and the remainder of NYC. The survey assessed such factors as personal and family exposure to the attack, prior exposure to violence, media exposure, current mental health problems, health effects, prejudice, school performance, student perspectives, and demographics. Results were weighted to reflect the true population of all NYC public school students in grades 4-12. Overall, a broad range of psychiatric disorders at a higher than expected prevalence was observed among NYC school children. Mental health impacts were observed citywide. Factors that placed children at higher risk for posttraumatic stress disorder and potentially other mental health problems following the attack included younger age, personal physical exposure to the attack or stressors resulting from the attack, having a family member exposed to the attack, exposure to previous traumatic events, being female, and being Hispanic or mixed/other ethnicity. Possible factors contributing to resilience of children in Ground Zero schools included high levels of social support, demographics, and lower than average rates of prior exposure to violence. (SM)

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ED 471 157

Effects of the World Trade Center Attack on NYC Public School Students

Initial Report to the New York City Board of Education

May 6, 2002

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The Board of Education of the City of New York

EFFECTS OF THE WORLD TRADE CENTER ATTACK ON NYC PUBLIC SCHOOL STUDENTS

Table of Contents

I. Executive Summary

Background 1

Method 1

Key Findings 2

Institutional Review Board 4

II. Background and Objectives

Background 5

Objectives 6

III. Methodology

Sample Design 7

Survey Instrument 9

Procedures 10

Timing 10

Methodological strengths and limitations 11

IV. Results

Sample description 13

Demographics 13

Prevalence of mental health problems 15
Definition of prevalence 15
Prevalence compared to rates prior to 9/11 17
Grade Group (Age) differences 18
Gender differences 20
Ethnic differences 21
Estimated number of children with mental health problems 24
Types of Exposure 25

Determinants of posttraumatic stress disorder following 9/11 30
Prevalence of PTSD symptoms 31
PTSD at Ground Zero and remainder of the city 31
PTSD by level of personal physical exposure 32
PTSD by level of family exposure 33
PTSD by prior exposure to trauma 34
PTSD by exposure to TV coverage 36
Children with PTSD who sought help 36
Multivariate model of PTSD risk factors 37

V. Conclusions and Future Directions

Summary 39

Further analysis of existing data 40

Suggestions for additional assessments 40

I. Executive Summary

BACKGROUND

Applied Research and Consulting (ARC) was commissioned by The New York City Board of Education to conduct an assessment of the mental health needs of students in the New York City public school system six months after the attack on the World Trade Center. ARC conducted this study in close collaboration with colleagues from Columbia University - New York State Psychiatric Institute, who were enlisted to provide scientific oversight. The Centers for Disease Control and Prevention agreed to assist with developing the survey's sample plan.

METHOD

- **Sample:** The needs assessment survey was conducted on a representative sample of 8,266 New York City public school students in grades 4-12, excluding Special Education District 75. The sample was drawn from 94 schools, selected randomly, proportional to size. The sampling plan included schools in 3 strata.
    - Ground Zero area (oversampled);
    - Other presumed High Risk areas (oversampled);
    - Remainder of New York City.

  Final results were weighted to reflect the true population of all NYC public school students in grades 4-12.

- **Survey domains:** Areas assessed by the survey included:

    - Personal physical exposure to the attack on 9/11
    - Family exposure
    - Prior exposure to violence
    - Media exposure
    - Exposure to Belle Harbor plane crash
    - Current mental health problems (probable psychiatric disorder)
    - Health effects
    - Prejudice
    - School performance
    - Service need and utilization
    - Student perspectives on the future
    - Demographics

- **Timing:** The survey was conducted six months after the 9/11 attack, which allowed for the assessment of mental health effects beyond the initial acute stage.

- **Compliance:** The student compliance rate was 92.6% in Strata 1; 91.9% in Strata 2; and 92.2% in Strata 3.

KEY FINDINGS

Prevalence of Mental Health Problems

1. A broad range of mental health problems (psychiatric disorders) was observed at a higher than expected prevalence among NYC public school children in grades 4-12.

2. It is estimated that as many as 75,000 children (10.5%) have symptoms consistent with **post-traumatic stress disorder (PTSD)**.

3. Estimates of other psychiatric disorders (including comorbid disorders) among NYC school children in grades 4-12 include:
   - 60,000 children (8.4%) with **major depression;**
   - 73,000 children (10.3%) with **generalized anxiety**;
   - 107,000 children (15.0%) with **agoraphobia** (fear of going out or taking public transportation);
   - 88,000 children (12.3%) with **separation anxiety** (fear of separation from parents);
   - 78,000 children (10.9%) with **conduct disorder;**
   - 16,000 children (5.1%) with **alcohol abuse** (grades 9-12 only).

4. It is estimated that 190,000 (26.5%) New York City public school children in grades 4-12 have at least one of the assessed mental health problems (excluding alcohol abuse) and require some form of intervention.

5. Approximately 16,000 (5.1%) children in grades 9-12 have alcohol abuse so severe as to impair their daily functioning.

6. Each of the mental health problems (probable psychiatric disorders) assessed exceeded the expected rates, based on pre-9/11 non-NYC community estimates.

7. **The mental health impact is observed citywide**: the prevalence of disorders is elevated all over the city, effects not being limited to Ground Zero schools.

8. At least two thirds of children with probable PTSD following the 9/11 attacks **have not sought any mental health services** from school counselors or from mental health professionals outside of school.

Exposure to 9/11 Related Events

9. **Personal physical exposure** (being personally exposed in some way to the attacks) was highest in children attending schools near Ground Zero **but was also experienced citywide.**

   - **Virtually all children in Ground Zero schools were personally physically exposed** to one or more effects of the attack, including 73% who were in or near the cloud of smoke and dust.

- **Two-thirds of children in the remainder of the City also experienced personal physical exposure to effects of the attack,** and reported having fled to safety (26%), having had difficulty getting home that day (36%), and/or continuing to smell smoke after 9/11 (41%).

10. **Rates of family exposure** (family member killed, injured, or in the WTC but escaped unhurt) were higher among students in schools outside Ground Zero than among students in schools near Ground Zero.

    - In the entire city, **11% of public school children had a family member or close friend exposed to the attack,** including **1%** who had a family member **killed in the attack.**

11. **Nearly two thirds (64%) of New York City public school children had been exposed to one or more traumatic events *prior* to 9/11**. These included seeing someone killed or seriously injured (39%), seeing the violent/accidental death of a close friend (29%) or family member (27%).

12. **Almost two-thirds (62%)** of New York City public school children spent a lot of their time **learning about the attack from the TV.**

13. **About 75%** of students **increased their reading of newspapers and magazines** to gain information about the attack and **more than 30% of students** sought additional information about the attack from the Internet.

Risk Factors for PTSD Following 9/11 Attacks

14. **Risks for PTSD following the 9/11 attacks are not limited to children who were directly exposed to the attacks.** Rather, there are multiple risk factors, many of which may differ geographically.

    Exposure risk factors associated with higher rates of PTSD include:
    - **Personal physical exposure to attack:** being injured, being in smoke/dust cloud, etc.
    - **Family exposure and loss:** family member escaped, hurt or died in the attacks.
    - **Previous exposure:** experience of being in a potentially traumatic situation before 9/11.
    - **Media exposure:** watching a lot of television or viewing other media coverage of the attacks.

    Preliminary analyses suggest that for children, exposure of a family member may be more important than personal physical exposure in predicting who becomes psychologically affected, at least for PTSD.

15. **Demographic, developmental, and personal history factors also place some children at higher risk for mental health problems following the 9/11 attacks.**

Children with posttraumatic stress disorder were more likely to be:

- **Younger** (those in grades 4-5 compared to those in grades 6-12);
- **Female**;
- **Hispanic**.

16. Further analyses currently underway:

- Identification of other factors that may place students at elevated risk for mental health disorders.
- Investigation of the protective role of school, teachers, school staff, mental health services and other support post 9/11.
- Identification of the associations of the distribution of disorders and impairment, according to grade, location, ethnic group, etc.

17. **Proposed Additional Assessments:**

- Survey children in K-3, utilizing appropriately sound methodological principles, to determine effects of 9/11 in younger children.
- Conduct a study with the same methodology as this study in September/October 2002, to examine persistence of mental health symptoms and impairment in grades 4-12.
- Survey teachers and other school personnel to assess how the Board of Education can better meet their needs post 9/11 and to identify ways to augment preparedness for any possible future disasters.
- Survey school mental health service providers (counselors, psychologists, social workers, etc.) to assess how best to meet their needs (training, available referral options, etc.).

18. Possible Actions:

- Expand existing mental health services within schools.
- Identify (map) local community mental health services available for each school, each district.
- Develop a citywide system for routine screening and referral for major mental health problems.

INSTITUTIONAL REVIEW BOARDS

All aspects of this study were carried out in full compliance with Institutional Review Board (IRB) approvals. The study was reviewed by and approved by the New York City Board of Education IRB and the Columbia University – New York State Psychiatric Institute IRB. In addition, the New York State Office of Mental Health, Special Review Committee for all World Trade Center Related Research, reviewed and approved all aspects of the participation of the Columbia University – New York State Psychiatric Institute investigators and staff.

II. Background and Objectives

BACKGROUND

Following the attack on the World Trade Center, Applied Research and Consulting (ARC) was commissioned by the New York City Board of Education to conduct a comprehensive needs assessment study to determine the psychological impact of the 9/11 attack and its aftermath among children in the New York City public schools. This preliminary report presents the overall results of this study. Further analyses are ongoing and will be presented in later reports.

To facilitate the most useful approach to this investigation, The Partnership for the Recovery of New York City Schools arranged with the Board of Education and ARC for the survey instrument and methodology to be developed, conducted and analyzed in close collaboration with colleagues at Columbia University's School of Public Health - New York State Psychiatric Institute, who provided scientific oversight, including expertise in the areas of child psychiatric epidemiology, assessment of mental health problems, and child health policy. ARC was also fortunate to receive the advice and consultation of the Centers for Disease Control and Prevention for developing the study's sampling plan. ARC had complete responsibility for carrying out the survey.

The invaluable contributions of all collaborators made this a truly joint effort of numerous people who deserve recognition:

- Applied Research & Consulting: Managing Director and Contract Principal Investigator: Michael Cohen; Contract Co-Principal Investigator: Nellie Gregorian; Director: Victoria Francis; Sampling Expert: Chris Bumcrot; Statistical Expert: Craig Rosen; Fifty Social Science Research Interviewers.
- Columbia University – NY State Psychiatric Institute: Principal Investigator: Christina W. Hoven; Co-Principal Investigators: Larry Aber, Patricia Cohen, Christopher P. Lucas; Co- Investigators: Cristiane Duarte, Renee Goodwin, Donald J. Mandell, Ezra Susser, Ping Wu; Statistical support: Henian Chen, Mark Davies, Fan Bin, Pat Zybert, Steven Greenwald; Other support: George J. Musa, Judith Wicks.
- Partnership for the Recovery of NYC Schools: Pamela Cantor.
- Centers for Disease Control & Prevention: Victor Balaban and Bradford Woodruff.
- Advisors to Principal Investigator: Elissa Brown, NYU; Claude Chemtob, VA, Honolulu; Steven Maranes, Yale Univ.; Robert Pynoos, UCLA; Betty Pfefferbaum, Univ. of Oklahoma; and Members of the National Trauma Center.

The research teams from ARC and Columbia University – NYSPI acknowledge that this important study could not have been conducted without the outstanding leadership from the

- NYC-Board of Education: Frances Goldstein; with support and assistance from Vincent Giordano, Lori Mei, Henry Solomon and Linda Wernikoff.

OBJECTIVES

The primary goals of this study were to:

- Assess how many children in New York City public schools, as a result of the 9/11 attacks on the World Trade Center, had a psychological reaction (probable psychiatric disorder) that resulted in a negative impact in their daily functioning;
- Determine how many children were exposed to the effects of the 9/11 attacks, either because they were personally and physically exposed or because one of their family members had been exposed;
- Identify specific risk factors that can help to identify children who are most at risk for the mental disorders assessed in this study;
- Determine current mental health service need and utilization resulting from the attacks of 9/11;
- Determine the geographical distribution of the effects of the 9/11 attacks on NYC public school children.

III. Methodology

SAMPLE DESIGN

The study sample was designed to produce results that could be considered representative of all New York City public school students in grades 4-12, excluding Special Education District 75. Thus, students throughout New York City, except in areas that were deliberately over-sampled, would have an equal probability of selection.

- Study design required N=8,000 students distributed across grades 4-12.
- Schools were to be randomly selected proportional to size, except for Strata 1, where there would be an attempt to recruit all schools containing grades 4-12.
- Classrooms were to be randomly selected within schools, and the number of classrooms selected was to be proportional to the size of the school.
- For each classroom selected, the effort to recruit each student would be in keeping with IRB approved consent procedures.
- Children in grades K-3 were excluded, as this age group requires different instruments and a different study methodology.
- Data would be weighted to allow the findings to be representative of the entire NYC public school population, grades 4-12.

Geographic Distribution

The student sample was to be drawn from schools from three geographic areas in order to obtain information from areas that had experienced different levels of exposure to the attack (see Figures 1 and 2):

- Ground Zero area (approximately 2,000 children);
- Other locations presumed to be High Risk Areas (approximately 2,000 children)
- The remainder of New York City (approximately 4,000 children).

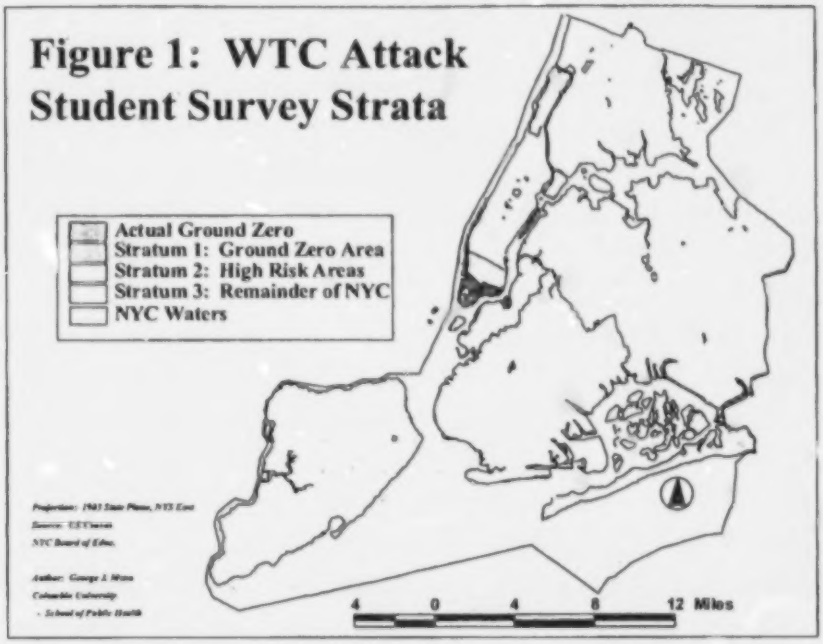


Figure 1: WTC Attack
Student Survey Strata
Actual Ground Zero
Stratum 1: Ground Zero Area
Stratum 2: High Risk Areas
Stratum 3: Remainder of NYC
NYC Waters
4 0 4 8 12 Miles

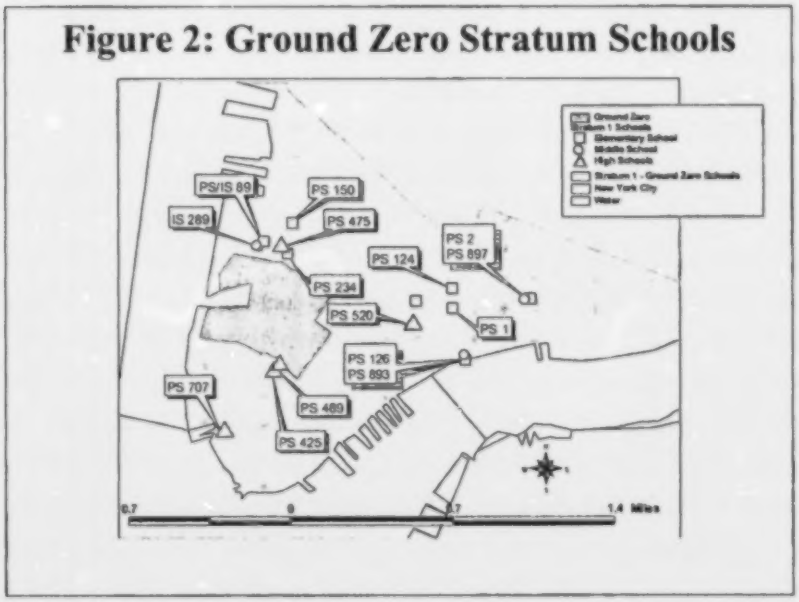


Figure 2: Ground Zero Stratum Schools
PS/IS 89
PS 150
IS 289
PS 475
PS 2
PS 897
PS 124
PS 234
PS 520
PS 1
PS 126
PS 893
PS 707
PS 489
PS 425
0.7 0 0.7 1.4 Miles

SURVEY INSTRUMENT

The instrument[1] was designed to assess several areas, including:

- Personal physical exposure to the effects of the attack of 9/11;
- Family exposure;
- Prior exposure to violence;
- Media exposure;
- Exposure to Belle Harbor plane crash;
- Current mental health problems (probable psychiatric disorder)[2];
- Health effects;
- Prejudice;
- School performance;
- Service need and utilization
- Student perspectives on the future;
- Demographics.

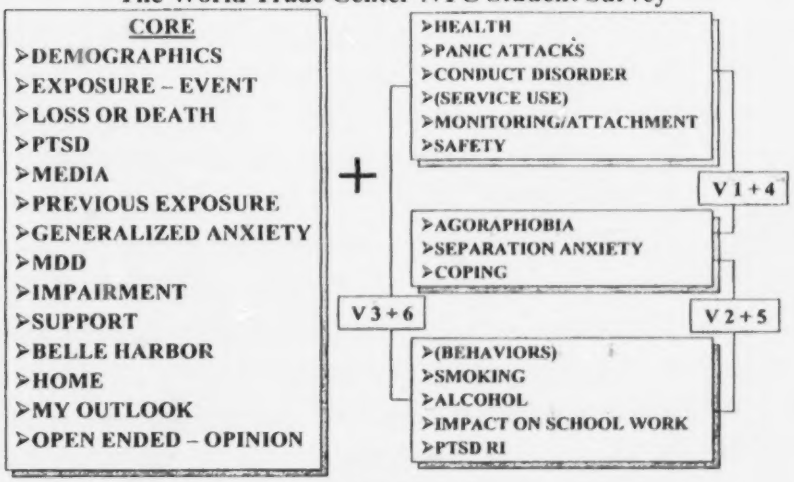
Due to time constraints, the questionnaires were split into four sections: a core and three non-core sections. Some of the non-core sections were abbreviated or omitted for children in grades 4-5. The core battery of questions was administered to all students. Three non-core sections for each of two grade groups (4-5 and 6-12) were combined with the core (six versions), so that each student received only two-thirds of the entire interview. This Planned Missing Data 3-Form Design was utilized so that missing (by design) information on the one third of the questions could be reliably inferred from the answers to the remaining two-thirds of the questionnaires, using appropriate statistical techniques (imputation). Figure 3 summarizes the domains included in each version of the questionnaire.

---

[1] Hoven, C.W., Duarte, C.S., Mandell, D., Musa, G., Wicks, J., Wu, P., & Lucas, C. (2002). WTC-NYC Child and Adolescent Questionnaire. Columbia University – NYSPI.

2 Lucas, C.P., Zhang, H., Fisher, P.W., Shaffer, D., Regier, D.A., Narrow, W.E., Bourdon, K., Dulcan, M.K., Canino, G., Rubio-Stipec, M., Lahey, B.B., & Friman, P. (2001). The DISC Predictive Scales (DPS): efficiently screening for diagnoses. Journal of the American Academy of Child and Adolescent Psychiatry, 40, 443-449.

Figure 3: Survey Measures:
The World Trade Center-NYC Student Survey



( ) = Not Measured in 4th – 5th Grades.

PROCEDURES

In grades 6-12 the interviews were randomly distributed. In grades 4-5 all students in each classroom received the same questionnaire.

The survey was self-administered (in classrooms) to all students in grades 6-12. In grades 4 and 5, it was read aloud by ARC interviewers as the students marked their own answers.

In all cases, there were two or more adults (research interviewers and teachers) in each classroom during the survey period, with at least one adult available to respond to individual questions.

TIMING

Many people who experience acute stress reactions immediately following a disaster stabilize and return to normal functioning within a few months or less. Symptoms of complicated or traumatic bereavement (as opposed to normal grief) may not become apparent until several months or even years later. The fact that this survey was conducted six months after the 9/11 attacks, after the initial phase of shock and distress had passed, allowed for the identification of children who may be experiencing persistent mental health problems.

Methodological strengths and limitations

Important **strengths** of this study include:

- A representative sample of New York City public school students in grades 4-12;
- Large geographic area (all of New York City);
- Assessment of multiple psychiatric disorders (probable) using valid measures;
- Assessment of a wide range of potential risk factors;
- Assessment of a potential confounding event, Belle Harbor plane crash;
- Inclusion of questions on racial/ethnic/religious prejudice following the attacks;
- Detailed demographic data;
- Assessment of the role of schools in the aftermath of the attack;
- Information obtained for geographic analysis and mapping of need;
- The student compliance rate was 92.6% in Strata 1, 91.9% in Strata 2, and 92.2% in Strata 3.

Important limitations:

- Like many other epidemiological studies, prevalence data are based on self-report questionnaires rather than structured diagnostic interviews. Detailed diagnostic screening would not have been possible for a study designed for classroom administration without the use of laptop computers and at least twice the allotted time. As the psychiatric assessment instrument used in this study (Diagnostic Predictive Scale – DPS) is a screening tool, the mental health problems reported here should be considered as probable psychiatric disorders only.
- The sample is limited to grades 4-12.
- The sample excludes children in grades K-3 and Special Education District 75 (but does include special education students in the other Districts).
- Results obtained from grades 4-5 may not be comparable to the results obtained from grades 6-12 because of differences in:
    - Administration mode (read aloud to students in grades 4-5 vs. read by the students themselves in grades 6-12)
    - Consent form (active in grades 4-5 vs. passive in grades 6-12), which possibly contributed to a biased sample in grades 4-5, at least at Ground Zero
    - Cognitive level of the younger children
- Results based on the sample of 4th and 5th graders in Ground Zero should be considered even more cautiously as:

- The total number of elementary school children near Ground Zero is fairly small -- the vast majority of children who attend school near Ground Zero are in middle school or high school; and,
- Elementary schools near Ground Zero were more likely to refuse school participation than elementary schools in other areas of the city.

IV. Results

Sample Description

A total of 8,266 students, drawn from a total of 94 randomly selected schools, participated in the needs assessment survey.

The study goal was the recruitment of approximately 900 children in each grade. The final distribution of students by grade is shown in Table 1.

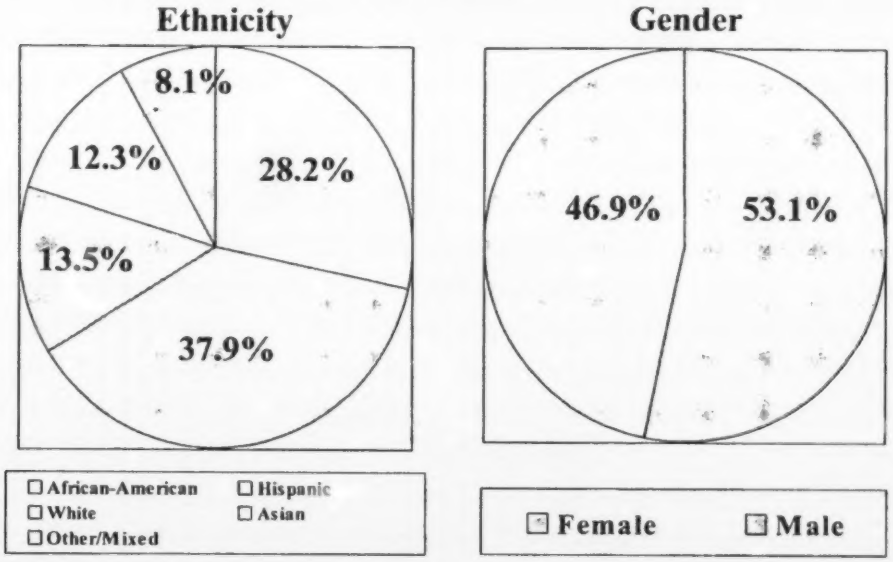
Table 1
Number of Students Per Grade Included in the Survey

Grade 4	655
Grade 5	596
Grade 6	1,113
Grade 7	939
Grade 8	888
Grade 9	1,068
Grade 10	922
Grade 11	1,069
Grade 12	1,016
TOTAL	**8,266**

Demographics

The survey comprised 8,266 children and adolescents aged 9-18. 46.9% were male, 53.1% were female. The ethnic distribution of the survey sample (28.2% African-American, 37.9% Hispanic, 13.5% White, 12.3% Asian, 8.1% Other/Mixed) (Figure 4). The demographics of the survey population approximate that of the NYC school student population for grades 4-12.

Figure 4: Gender and Ethnicity of NYC School Survey Participants Grades 4-12
(N = 8,266)



PREVALENCE OF MENTAL HEALTH PROBLEMS

This initial report focuses primarily on the prevalence of mental health problems (probable disorders) and rates of exposure to trauma. This report specifically addresses posttraumatic stress disorder. More comprehensive analyses, including other variables assessed in the study, will be included in later reports.

Definition of Prevalence

Prevalence of psychiatric disorders is generally defined in two ways:

- ***Simple prevalence*** is the proportion of individuals who have symptoms consistent with a given mental disorder. This approach is widely used, but may overstate the proportion of individuals who need help. For example, some individuals with depression may be severely impaired, while others may be functioning relatively well despite feeling depressed. Simple prevalence does not distinguish between these two conditions.

- ***Prevalence with impairment*** is the proportion of individuals assessed who have symptoms consistent with a given mental disorder AND who also report impairment in functioning (i.e., not being able to do usual activities, having parents or teachers often upset with them, having unexplained problems with school work, etc.). This is a more conservative estimate of prevalence, which includes only individuals whose day-to-day activities are being impacted by their mental health problems, and is known to be a good predictor of mental health service need. This approach to defining a (probable) disorder is consistent with diagnostic criteria, as defined in the DSM-IV.[3]

- **All prevalence results reported here are based on the most conservative definition, "prevalence with impairment"**. Thus, the reported prevalence provides a good indicator of the proportion of NYC public school children in grades 4-12, excluding Special Education District 75, who are probably in need of mental health services.

Prevalence of Mental Health Problems

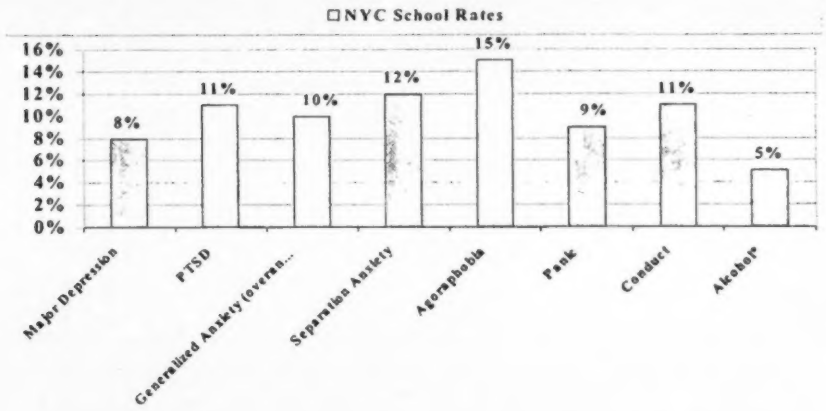
Figure 5 shows the current prevalence of mental health problems assessed in this study among NYC public school children in grades 4-12. It is critically important to recognize that the disorders assessed in this study are NOT the only possible mental disorders experienced by children and adolescents in grades 4-12. For example, a relatively common disorder in this age group is attention deficit/hyperactivity disorder (ADHD), but it was not assessed in this study because ADHD was not expected to be related to a traumatic experience.

Mental health problems (probable psychiatric disorders) were observed at a higher than expected prevalence among NYC school children in grades 4-12.

---

[3] American Psychiatric Association, Diagnostic and Statistical Manual for Mental Disorders (DSM-IV), 4th Edition, 1994.

Figure 5: Prevalence[1] of Mental Health Problems (probable) Post WTC Attack Among NYC Public School Students[2] Grades 4-12



- Weighted to reflect sampling design. Maximum number of missing by disorder never exceeded 6%.
- Assessed 6 months post 9/11.
- * Grades 9-12 only.

One out of every four NYC public school children (27%) meets criteria for one or more of the probable psychiatric disorders assessed in this study *and* also reports problems in their day-to-day functioning:

- One out of every ten children (10.5%) has **posttraumatic stress disorder (PTSD)** with impairment in their daily functioning.
- One out of every seven children (15.0%) has **agoraphobia** with impaired functioning.
- Rates of other psychiatric disorders with impairment among NYC school children in grades 4-12 include:
  - 8 % with **major depressive disorder (MDD);**
  - 10% with **generalized anxiety disorder (GAD);**
  - 12% with **separation anxiety disorder (SAD);**
  - 9% with **panic attacks**;
  - 11%with **conduct disorder;**
  - 5% with **alcohol abuse** (grades 9-12 only).

Prevalence of Mental Disorders Compared to Rates Prior to the 9/11 Attacks

We cannot definitively determine how much of the current prevalence of students with (probable) psychiatric disorders is specifically a result of the 9/11 attacks. One way of evaluating the mental health impact of the attacks would be to compare our results with those of studies conducted prior to 9/11. However, there are no data on the overall prevalence of mental disorders among NYC public school students in grades 4-12 *prior to* September 11, 2001. Fortunately, pre-9/11 studies have been conducted among similar age groups in other communities, using a diagnostic instrument related to the one applied in the current study (see Figure 6). The present study assessed current prevalences based on a screen instrument (DPS)[4] only, generating estimates which can be compared to previous prevalences obtained in a full DISC-2.3[5] assessment. Although this comparison is not perfect, it allows us to identify the increase in rates, above what would be expected. (See Figure 6)

The rates of mental health problems (probable disorders) in the present survey are compared with published data on child mental disorders obtained in a four-site (metropolitan San Juan, PR; New Haven, CT; metropolitan Atlanta, GA; and Westchester County, NY) NIMH-MECA study conducted prior to 9/11 (Shaffer et al 1996). Although the current NYC schools study indicates rates for psychopathology higher than previous community estimates, the overall pattern of results is quite similar.

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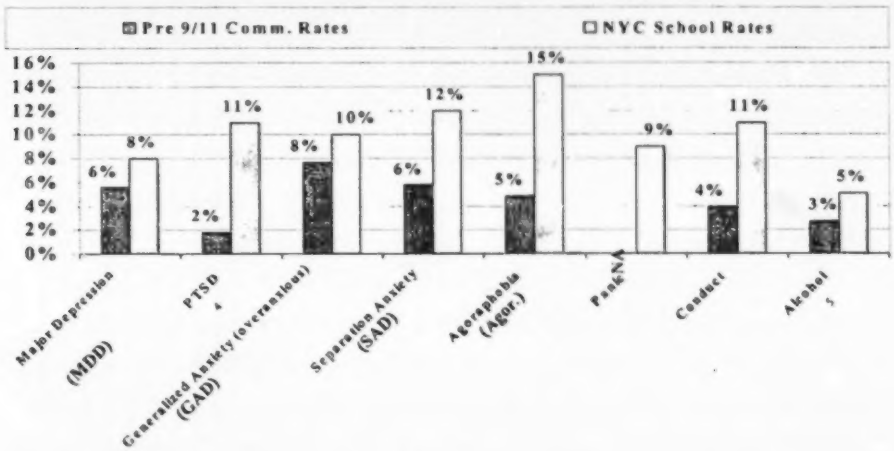
[4] Op. Cit.

[5] Shaffer, D. et al (1996). The NIMH Diagnostic Interview Schedule for Children Version 2.3 (DISC-2.3): Description, Acceptability, Prevalence Rates, and Performance in the MECA Study. Journal of the American Academy of Child and Adolescent Psychiatry, 35, 7.

Figure 6: Prevalence[1] of Mental Health Problems Post WTC Attack Among NYC Public School Students[2], Compared to Pre 9/11 Non-NYC Community Estimates[3], Grades 4-12



- Weighted to reflect sampling design. Maximum number of missing by disorder never exceeded 6%.
- Assessed 6 months post 9/11.
- Shaffer, D. et al (1996). The NIMH Diagnostic Interview Schedule for Children Version 2.3 (DISC-2.3): Description, Acceptability, Prevalence Rates, and Performance in the MECA Study. *American Academy of Child and Adolescent Psychiatry*, 35:7.
- MECA Study, New York Site only.
- MECA Study ages 9 through 17 only and NYC Public School Student Survey, Grades 9-12 only.

NYC public school students show elevated rates of mental health problems (probable psychiatric disorders) relative to the comparison study conducted prior to 9/11/01.

Compared to child-adolescent prevalence rates of **mental disorders with impairment** reported in the NIMH-MECA study (Shaffer, 1996), the NYC public school student rates post 9/11 are higher for each of the measured disorders:

- **Major Depression** (MDD) in NYC students is 1 and 1/3 times (133%) that of the MECA rate
- **Posttraumatic Stress Disorder** (PTSD) in NYC students is 5 and ½ times (550%) that of the MECA rate
- **Generalized Anxiety Disorder** (GAD/OAD) in NYC students is 1 and ¼ times (125%) that of the MECA rate
- **Separation Anxiety** (SAD) in NYC students is twice (200%) that of the MECA rate
- **Agoraphobia** (AGOR) in NYC students is three times (300%) that of the MECA rate
- **Conduct Disorder** (CD) in NYC students is 2 and ¾ (275%) that of the MECA rate
- **Alcohol Use** (Alc) in NYC students is 1 and 2/3 (167%) that of the MECA rate

This report will now review individual factors (age, gender and ethnicity) related to each type of probable psychiatric disorder.

Grade-Group Differences in Prevalence of Mental Health Problems

Younger children (grades 4 and 5) were more likely than older children (grades 6-12) to experience **PTSD or other psychiatric disorders involving intense fear and avoidance of usual activities** (Figures 7 and 8).

- Younger children were *twice* as likely as older children to meet criteria for **PTSD, agoraphobia,** or **separation anxiety disorder** (a disorder primarily seen in younger children). They were also somewhat more likely to have **panic attacks**.
- Older children were more likely than younger children to (probably) have **conduct disorder** or **depression.** This is consistent with other research findings showing higher rates of conduct and mood problems as children enter adolescence.

Figure 7: Grade-group Differences in the Prevalence of Mental Health Problems Post WTC Attack Among NYC Public School Students

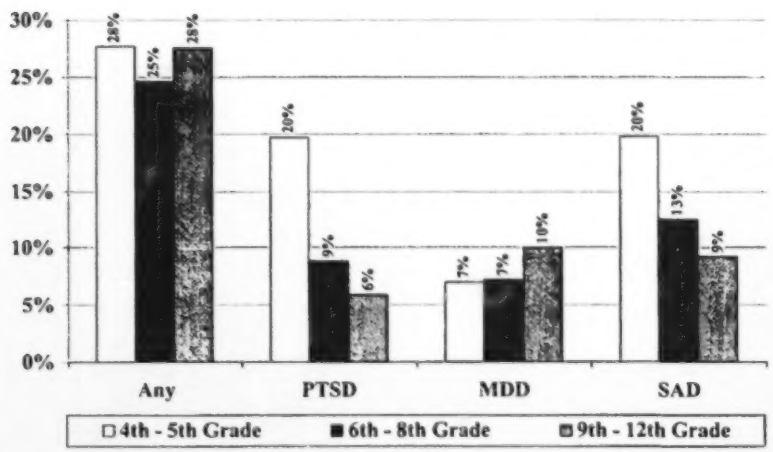
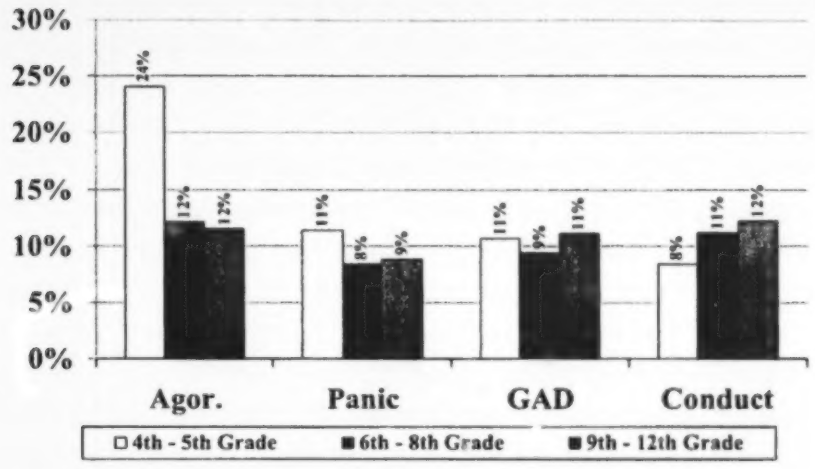


Figure 8: Grade-group Differences in the Prevalence of Mental Health Problems Post WTC Attack Among NYC Public School Students



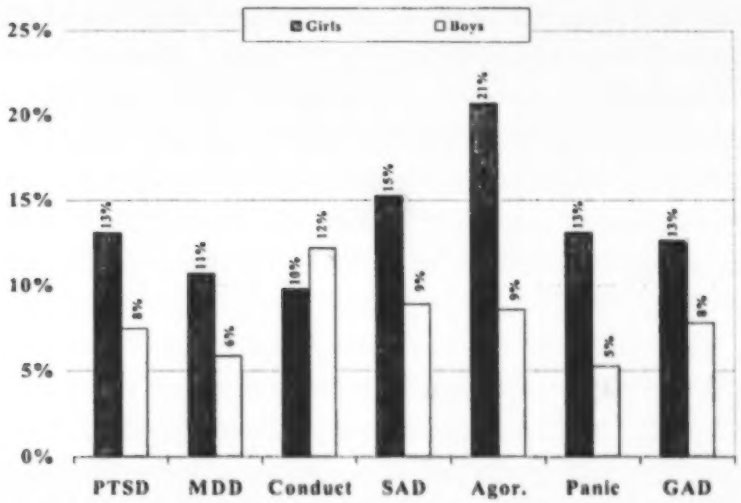
Gender Differences in Prevalence of Mental Health Problems

Rates of most psychiatric disorders were higher among girls than boys (Figure 9):

- Girls had higher rates of **PTSD, depression, separation anxiety, agoraphobia, panic,** and **generalized anxiety** disorders than did boys.
- Boys had higher rates of **conduct disorder** than did girls.

These results are consistent with other psychiatric epidemiology research results indicating higher rates of anxiety and depression among girls relative to boys.

Figure 9: Gender Differences in the Prevalence[1] of Mental Health Problems Post WTC Attack Among NYC Public School Students[2] Grades 4-12



1 Weighted to reflect sampling design. Maximum number of missing by disorder never exceeded 6%.
2 Assessed 6 months post 9/11.

Ethnic Differences in Prevalence of Mental Health Problems

Hispanics and children of "other or mixed race" were the most likely to report mental health problems (Figures 10 and 11). Differences by ethnicity were smaller than differences by gender or age.

- Hispanic and "other/mixed race" children had the highest prevalence of **PTSD, separation anxiety disorder, agoraphobia, and panic attacks.**
- Asians had the lowest prevalence of **panic attacks** and **conduct disorder.**

[Note: These preliminary analyses do not control for the effects of other factors that vary across ethnic groups, such as socio-economic status.]

Figure 10: Ethnic Differences in the Prevalence of Mental Health Problems Post WTC Attack Among NYC Public School Students, Grades 4--12

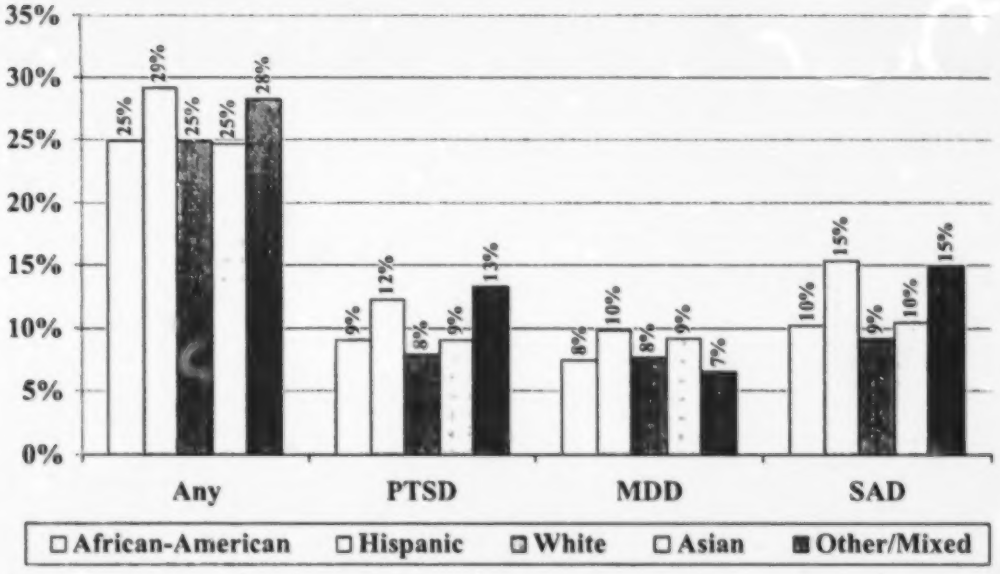
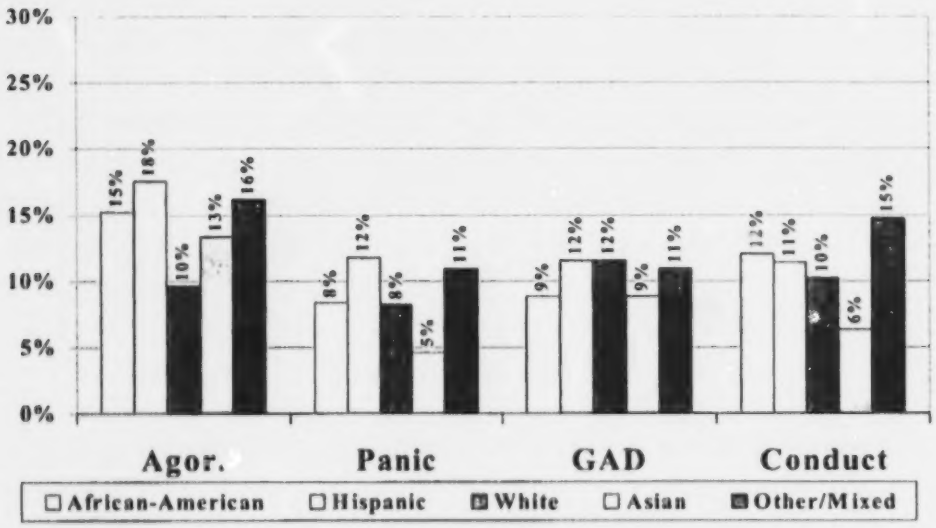


Figure 11: Ethnic Differences in the Prevalence of Mental Health Problems Post WTC Attack Among NYC Public School Students, Grades 4-12



Estimated Number of Children with Mental Health Problems

Because the survey was based on a representative sample of children from public schools throughout New York City, it is possible to estimate the total population of children in grades 4 to 12 who may be experiencing mental health problems (see Table 2):

- We estimate that 190,000 children are experiencing any type of seven possible mental health problems severe enough to impair their functioning.
- In grades 9-12, we estimate that 5% (16,000) of the students have an alcohol abuse problem, to the extent of being impaired by it.

Table 2

Numbers of NYC Students in Grades 4-12 Estimated to Have A Probable Disorder with Impairment Six Months After the 9/11 Attack

Disorder	Rate (%)	# of Students (Estimated)
Posttraumatic Stress Disorder (PTSD)	10.5	75,176
Major Depression (MDD)	8.4	60,141
Generalized Anxiety (GAD)	10.3	73,744
Separation Anxiety (SAD)	12.3	88,064
Conduct Disorder	10.9	78,040
Panic Disorder	9.3	66,585
Agoraphobia	15.0	107,395
Any of the Above Disorders	**26.5**	**189,731**

NOTE: These individual disorder estimates refer to the percentage of children who have each type of probable psychiatric disorder listed. It is possible and common for a child to have more than one type of disorder at one time (comorbidity). The estimate of "Any of the Above Disorders" considers children having one or more, but in this instance we are only concerned with children who have at least one of the disorders. Therefore, "Any of the Above Disorders" reflects the number of children in need of mental health services associated with the disorders assessed in this study. As indicated above, students may have additional psychiatric disorders which were not assessed in this study but which also place them in need of mental health services. In addition, approximately 5% students (16,000) in grades 9-12 warrant services for alcohol abuse, which was also assessed as a (probable) disorder with impaired functioning.

EXPOSURE TO 9/11 EVENTS

Types of Exposure

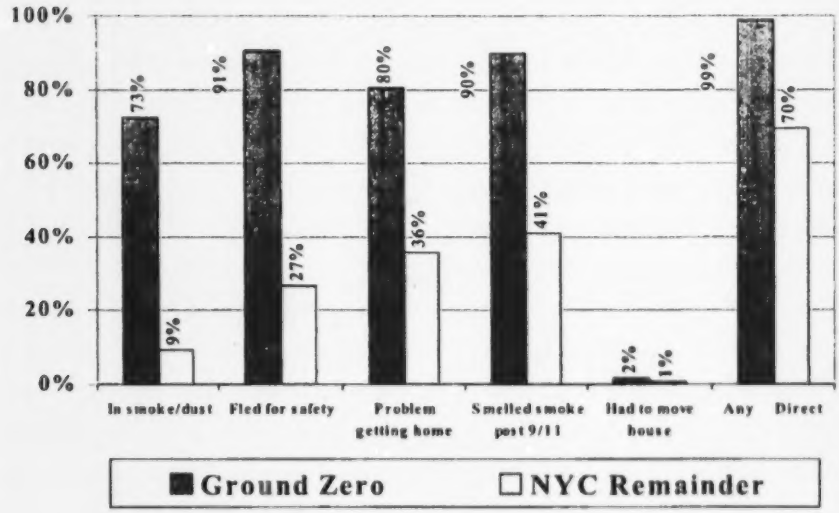
We defined different types of "exposure" very broadly, to investigate several different ways in which children might have been affected by the events of 9/11 and its aftermath. Areas we assessed included:

- **Personal physical exposure,** i.e., being personally impacted by the World Trade Center attack. In addition to asking about personally witnessing the attack and being in or near the cloud of dust and smoke; we also assessed other more widespread experiences, such as having to be evacuated to safety or having difficulty getting home following the attack.
- **Family exposure,** i.e., being impacted by having a family member who was killed, injured, or who witnessed World Trade Center attack but survived unhurt.
- **Exposure to media images** of the attack, i.e., the amount of time children spent watching television coverage of the attack.
- **Prior exposure** to potentially traumatic events, i.e., severe injury, witnessing a death or serious injury, or death of a close friend or family member *before* the World Trade Center attack. Previous research on mental health effects of disasters reveals that children (and adults) who have experienced other traumatic events *prior* to a given trauma are often at higher risk for being re-traumatized in a new traumatic situation:

Personal physical exposure was highest in schools near Ground Zero **but was also experienced citywide** (see Figure 12).

- **Virtually all children in Ground Zero schools were directly exposed** to one or more effects of the attack.
    - Over 80% had to flee for safety, had difficulty getting home, and continued to smell the smoke after 9/11.
    - 73% were in or near the cloud of smoke and dust on the day of the attack.

Figure 12: Type of Personal Physical Exposure to the WTC Attack Among NYC Public School Students[1,2], Grades 6-12: Ground Zero Compared to the Remainder of the City



- **Two-thirds of children in the remainder of the City were exposed to effects of the attack,** even if they were not near the World Trade Center:
  - Roughly one out of four children reported fleeing to safety.
  - Over one out of three children had difficulty getting home or continued to smell smoke after 9/11.

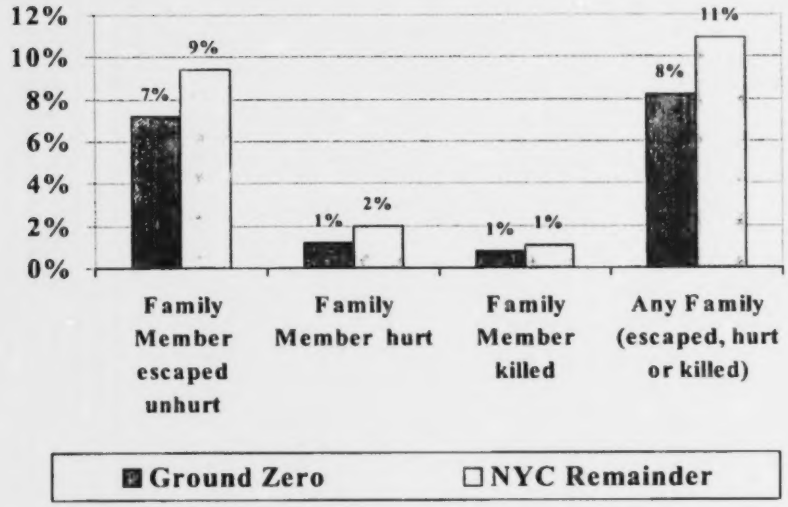
- **A small proportion of children (1%) were forced to move from their home.**

Family Exposure to 9/11 Events

- **Rates of family exposure** (family member killed, injured, or in the WTC but escaped unhurt) were **higher among schools outside Ground Zero** than in schools within Ground Zero (Figure 13).

- **11%** of public school children citywide had a **family member exposed in some way to the attack.**
  - One percent (1%) of public school children **lost a family member** in the World Trade Center attack.

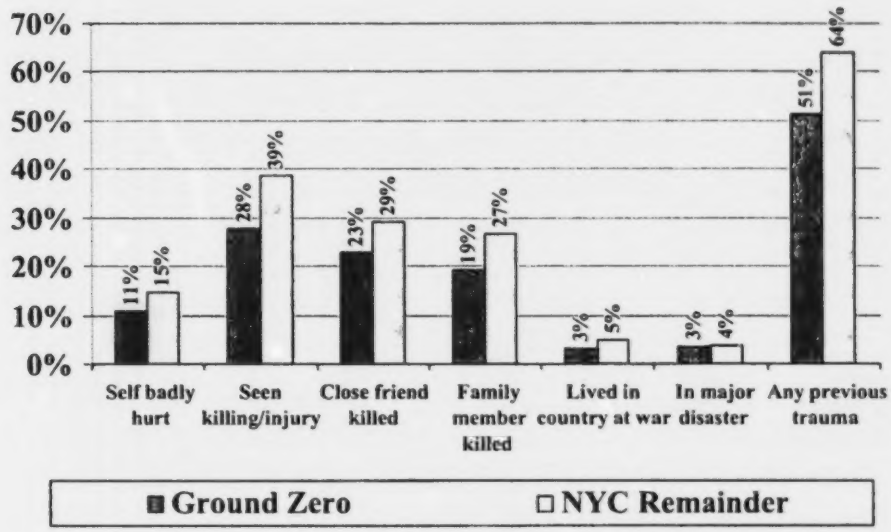
Figure 13: Type of Exposure to Family Member due to the WTC Attack among NYC Public School Students, Grades 6-12: Ground Zero Compared to the Remainder of the City



Prior Exposure to Trauma

Research on communities affected by disasters has shown that people who have had a *prior history* of exposure to traumatic events may be at higher risk for a spectrum of mental health problems following a disaster. Thus, in addition to assessing children's exposure to the events of 9/11, we also asked about their prior experiences of other types of traumatic events (Figure 14).

Figure 14: Type of Previous Traumatic Exposure Among NYC Public School Students[1,2], Grades 6-12: Ground Zero Compared to the Remainder of the City



Nearly two thirds (64%) of New York City public school children had been exposed to one or more traumatic events *prior* to 9/11:

- Two out of five students had **seen someone killed or seriously injured;**
- One out of four children reported the violent or accidental **death of a close friend**
- One out of four children reported the violent or accidental **death of a family member**.
- One out of seven children had themselves been **badly hurt** in a violent or accidental situation.

Children in **Ground Zero schools** reported ***lower*** rates of exposure to prior trauma than did children in the remainder of the city.

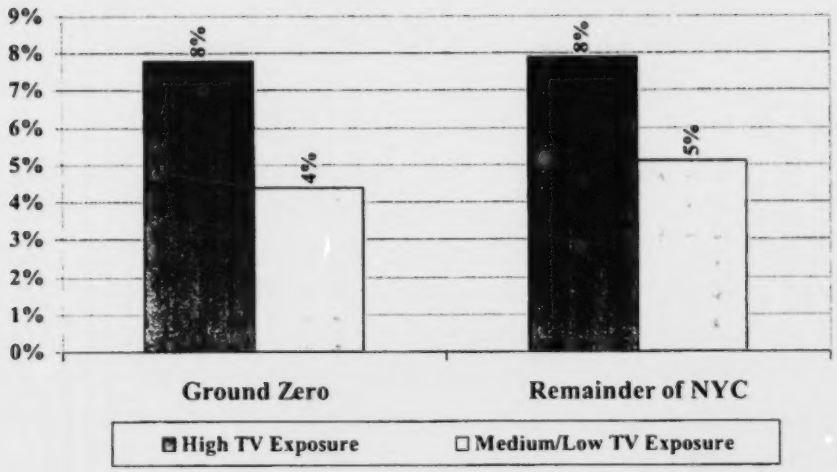
Exposure to Media Images

Rates of exposure to television news coverage (which included replaying of violent images from the attack) were high. When New York City public school children were asked **how much of their time they spent learning about the attack from the TV:**

- Almost two-thirds (62%) said **"a lot"** of their time;
- One third (33%) said "**some**" of their time;
- Only 5% said "**not much**" of their time.

There were no differences between children in Ground Zero schools and in the rest of the city in their reported viewing of television news about the attack (see Figure 15).

Figure 15: Rates of PTSD with Impairment by Media Exposure (Grades 6-12)



DETERMINANTS OF POSTTRAUMATIC STRESS DISORDER FOLLOWING 9/11

As discussed in Section I, we observed a higher prevalence of several psychiatric disorders, including PTSD, following the 9/11 attacks than had been observed in community studies conducted prior to 9/11.

The psychiatric disorder most likely to occur in the aftermath of a disaster is PTSD. Most previous studies have been conducted in the period soon after the disaster.[6,7] Indeed, in the current survey, PTSD was at least five times higher than would be expected in the absence of a specific new trauma, being also the disorder with the highest estimated increase. In addition, PTSD is a relatively severe disorder that can greatly affect children's functioning. Therefore, in this first report, we decided to concentrate on PTSD. However, this does not definitively answer the degree to which any current mental health problem can be solely attributed to the 9/11 attacks. We hypothesize that many of the risk factors associated with higher rates of PTSD may be associated with higher rates of other psychiatric disorders as well, which we will test and address in subsequent reports.

This next section examines the **prevalence of PTSD among children who did and did not experience various types of exposure to the 9/11 attacks.** This serves two purposes:

- To determine the extent to which elevated rates of PTSD can be attributed to children's exposure to potentially traumatic events related to the 9/11 attacks, and,
- To elucidate specific risk factors that can be used to identify subgroups of children who are most likely to have current mental health problems.

Our examination of how exposure to 9/11 events was related to children's mental health is based on two analytical decisions:

- **We conducted separate analyses for children in Ground Zero schools (Strata 1) and those elsewhere in the City (Strata 2 and 3).** Students in the "Ground Zero" sub-sample were analyzed separately because they were the children who were most directly exposed to the actual attack. Strata 2 and Strata 3 were combined to form the "remainder of NYC" sub-sample.

- **We focused primarily on children in grades 6-12.** This was done to facilitate comparisons between the Ground Zero and the remainder of NYC, and because 4th and 5th graders in the Ground Zero sample were proportionately underrepresented. More detailed analyses are needed to examine this population than is possible for this first report.

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[6] Pynoos, R., Frederick, C., Nader, K., Arroyo, W., Steinberg, A., Eth, S., Nunez, F. & Fairbanks, L. Life threat and posttraumatic stress in school-age children. Archives of General Psychiatry, 44, 1057-1063.

[7] Pfefferbaum, B., Nixon, S.J., Krug, R.S., Tivis, R.D., Moore, V.L., Brown, J.M., Pynoos, R., Foy, D. & Gurwitch, R.H. Clinical needs assessment of middle and high school students following the 1995 Oklahoma City bombing. American Journal of Psychiatry, 156:7, 1069-1074.

Prevalence of PTSD Symptoms

Eighty-seven percent of the students reported at least one PTSD symptom. Over three quarters of NYC public school children report often thinking about the World Trade Center attacks, and about half of all children report trying to *avoid* thinking, hearing or talking about it. A student needed to report having six or more of these symptoms to be classified as probably having PTSD. As previously shown, and in contrast to the percentages shown here for individual symptoms, only 11% of students have (probable) PTSD.

Table 3

Frequency of Specific PTSD Symptoms Reported by NYC Public School Students, Grades 4-12

Symptom	Report Symptom
Often think about WTC event	76%
Try not to think /hear/talk about it	45%
Harder to keep mind on things	25%
Have problems sleeping	24%
Stop going places/doing things that remind	18%
Have nightmares	17%
Try to keep away from people who remind	16%
Stopped thinking about future	16%
Report ANY of above PTSD symptoms	**87%**

Rates of PTSD in Ground Zero Schools and in the Remainder of the City

[Note: All data in this and the following sections comparing rates of PTSD in Ground Zero schools and in the remainder of NYC are based on grades 6-12 only.]

We had anticipated that rates of PTSD would be highest among children in Ground Zero schools due to their proximity to the actual attack and high rates of direct exposure. **Surprisingly, the rate of PTSD citywide was similar to the rate of PTSD in Ground Zero schools.** The prevalence of PTSD with impairment among children in grades 6-12 was:

- 7% in **Ground Zero** schools, and
- 7% in the **remainder of NYC**.

The reasons why rates of PTSD at Ground Zero were not higher than elsewhere are complex and hence have not been fully explored. However, the relationship of PTSD and the different types of exposure helps to understand this situation.

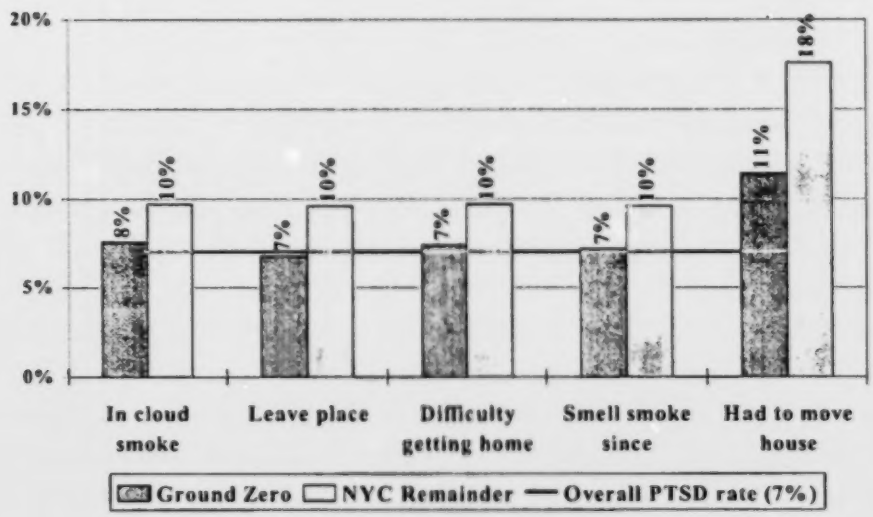
The following sections examine rates of PTSD associated with various types of exposure among children in Ground Zero schools and elsewhere in the city.

Rates of PTSD by Level of Personal Physical Exposure

Figure 16 indicates the prevalence of PTSD among children in both Ground Zero and other schools who experienced various types of direct exposure. The reference line, included to facilitate comparison, indicates the overall prevalence (7%) of PTSD among all children in grades 6-12.

There were few differences in rates of PTSD by level of exposure *within* the Ground Zero sample because almost all children in Ground Zero schools were directly exposed to effects of the attack.

Figure 16: Rates of PTSD Associated with Various Personal Physical Exposures in Ground Zero and the Remainder of NYC (Grades 6-12)



Among students in schools outside of Ground Zero, **rates of PTSD were higher among children who were directly exposed to the attack or to its effects:**

- Rates of PTSD were roughly one-third higher among children who were **in or near the cloud of smoke and dust.**

- Rates of PTSD were also one-third higher among children who experienced more indirect effects, such as **having to flee to safety, difficulty getting home,** or **continuing to smell smoke after 9/11.**
- The few children (1%) who had to **leave their homes** because of the attack were ***twice as likely*** as other children to develop PTSD.

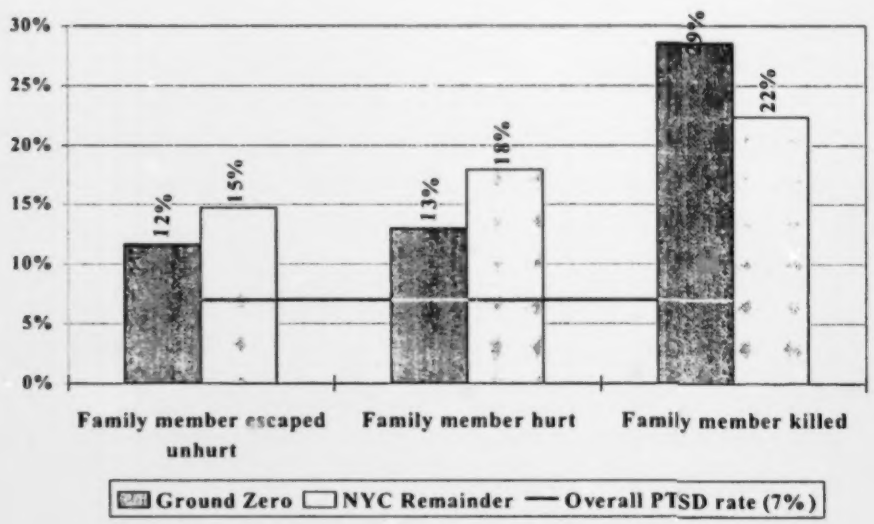
Rates of PTSD by Level of Family Exposure

Rates of PTSD were elevated among students who had a family member exposed to the attack, especially if that person died. Exposure of family members was associated with higher rates of PTSD for both children in Ground Zero schools and those in the remainder of NYC.

Among children in grades 6-12 (Figure 17), rates of PTSD were:

- Roughly *two times higher* among children whose **family member survived** the attack;
- Roughly *three to four times higher* among children who **lost a family member** in the attack.

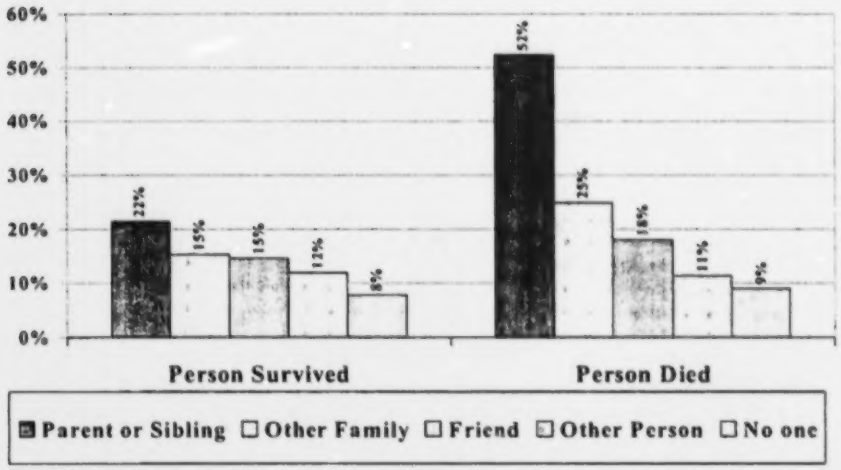
Figure 17: Rates of PTSD Associated with Various Family Exposures in Ground Zero and the Remainder of NYC (Grades 6-12)



As might be expected, **rates of PTSD depended on the degree of psychological closeness to the person exposed** (children in grades 6-12, Figure 18):

- Rates of PTSD associated with knowing someone who died or survived were higher if the person involved was a family member rather than simply an acquaintance.
- Rates of PTSD were highest if the person involved was a **parent or sibling:**
  - *Half* of the children who **lost a parent or sibling** had PTSD.
  - *One out of four* children with a **parent or sibling who survived** the attack had PTSD.

Figure 18: Rates of PTSD by Closest Person Exposed to Attacks (Grades 4-12)



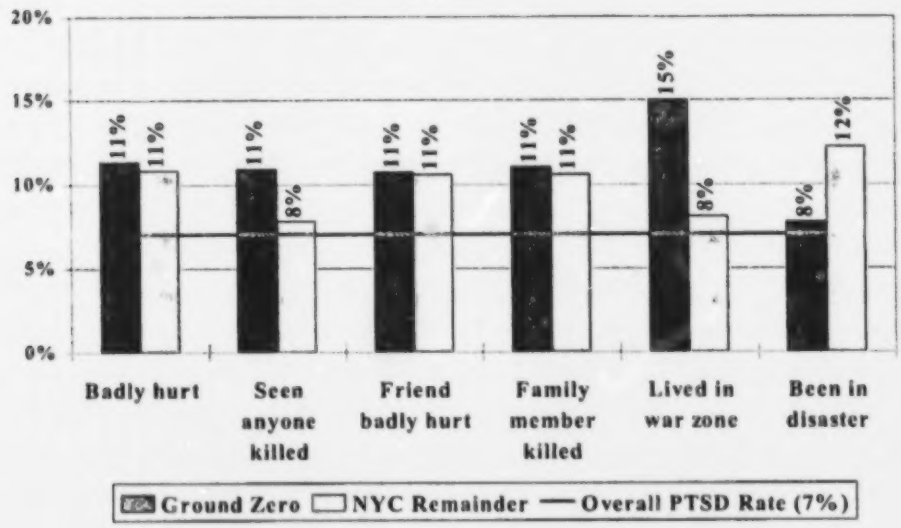
Rates of PTSD by Prior Exposure to Traumatic Events Before 9/11

Exposure to other traumatic events *prior* to 9/11/01 was associated with higher prevalence of PTSD following the attacks (see Figure 19):

- Among children at Ground Zero and in the remainder of the city, PTSD rates were higher among children who had previously been **severely injured,** had a **close friend who was hurt or killed,** or had a **family member who was killed** *before* the World Trade Center attacks.

- Rates of PTSD were also higher among the relatively few children (less than 5%) who had previously been exposed to **war** or a **natural disaster**, but the pattern of results was less consistent between Ground Zero and the remainder of NYC.

Figure 19: Rates of PTSD Associated with Previous Trauma Exposure in Ground Zero and the Remainder of NYC (Grades 6-12)



Rates of PTSD by Exposure to TV Coverage

Prevalence of PTSD was higher among children who **spent "a lot" of their time learning about the attacks from watching TV,** than among children who only spent "some" or "not much" time watching news coverage of the attack. A similar pattern was observed in Ground Zero schools and in the remainder of the city.

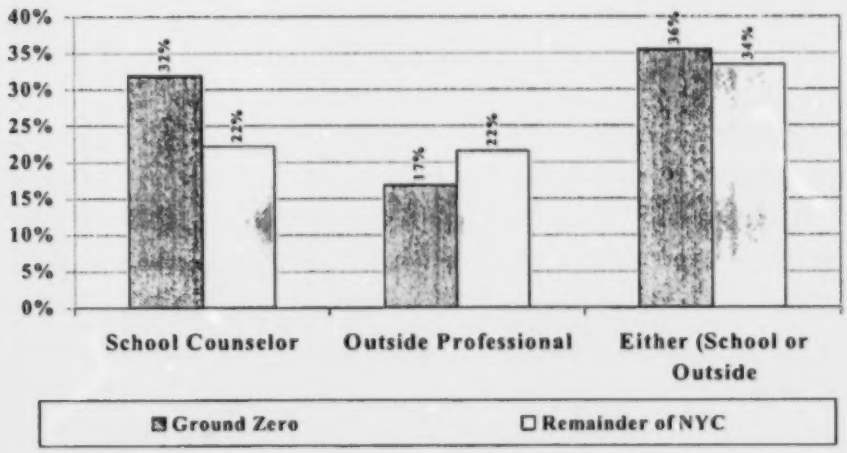
These initial analyses cannot determine the direction of causality between TV viewing and rates of PTSD. Repeated exposure to violent images on TV may have exacerbated some children's PTSD symptoms. Yet, it is also possible that children who were the most anxious and absorbed by the attacks spent more time seeking out information from the media than did children who felt less distressed.

Proportion of Children with PTSD Who Sought Help After 9/11

The proportion of children with PTSD who spoke to a school guidance counselor or school social worker about the World Trade Center attack was higher in Ground Zero schools than in schools elsewhere in the city.

However, roughly **two thirds of children with PTSD** and impaired functioning following the 9/11 attacks say they **have not sought any treatment** from either a school guidance counselor or social worker or from an outside health professional (doctor, therapist, social worker, psychologist, psychiatrist, or nurse) (see Figure 20).

Figure 20: Proportion of Children with PTSD with Impairment Who Spoke to Someone About the WTC Attack



Multivariate Model of PTSD Risk Factors

Several demographic variables and exposure factors that are associated with increased risk for PTSD have been discussed in this report. However, these simple analyses only considered each variable individually.

Multivariate (multiple variable) models consider the impact of several predictors of mental health problems acting at the same time, as is the case in real life. We are examining the impact of each potential risk factor, adjusting (or controlling for) the impacts of other risk factors. (For example, if the likelihood of being exposed to community violence varies by gender, you cannot understand the relationship of gender with PTSD unless you also "control" for exposure to violence.)

Figure 22 shows the results of a logistic regression model with several factors predicting likelihood of having PTSD. The relationship between each variable and PTSD symptoms is expressed in "odds ratios", a statistical measure used in epidemiological research. Odds ratios close to 1 indicate variables that are unrelated to risk of PTSD. Odds ratios larger than 1 indicate variables associated with higher risk for PTSD – in general, the larger the odds ratio, the greater the risk. Odds ratios smaller than 1 in general, are associated with lower risk for PTSD (see Table 4).

Table 4: Multivariate Model Predicting PTSD Among NYC Public School Students, Grades 4-12[1]:

Variable	Odds ratio (95% Confidence Interval)
Female	1.88 (1.84 – 1.91)
Grade (9th-12th is Reference category)	
4th –5th grade	4.02 (3.93 – 4.10)
6th – 8th grade	1.66 (1.62 – 1.70)
Ethnicity (White is Reference group)	
African-American	0.99 (0.97 – 1.03)
Hispanic	1.22 (1.18 – 1.26)
Asian	1.07 (1.03 – 1.11)
Mixed/Other	1.28 (1.23 – 1.33)
Any Physical Personal Exposure	1.64 (1.61 – 1.67)
Any Family Exposure	2.02 (1.98 – 2.06)
Any Prior Trauma	1.65 (1.62 – 1.68)

[1] All Odds Ratios are statistically significant at p value ≤ 0.05, except for African-Americans vs. Whites.

The preliminary model confirms the importance of several factors in predicting who is most at risk for posttraumatic stress disorder:

- **Age/grade** (being in grades 4-5 vs. being in grades 9-12) is the strongest factor in predicting risk for PTSD;
- **Personal physical exposure** and **family exposure** to the WTC attack are both strong predictors of who develops PTSD. Exposure of family members is more important than personal physical exposure in determining who will have PTSD.
- **Females** are at higher risk than males;
- Children who have experienced **traumatic events prior** to 9/11 are at higher risk for PTSD.
- People who describe their ethnicity as **Hispanic** or **"mixed/other"** are at higher risk than members of other races/ethnicities. Although statistically significant, ethnicity is less important than other factors (such as age, gender, or prior trauma exposure) in predicting who has PTSD.

Future analyses will consider additional predictive models that include the impact of specific types of exposure and variables, such as geographic location, on risk of PTSD and on other disorders. Results of these continuing statistical analyses will be presented in future reports.

V. Conclusions and Future Directions

Summary

The results of this needs assessment survey suggest three overall conclusions (additional findings are summarized in the Executive Summary beginning on page 1):

1. **A broad range of psychiatric disorders at a higher than expected prevalence was observed among NYC school children:**
   - Rates of PTSD, depression, agoraphobia and separation anxiety were **two or more times higher** than rates of these disorders in other Unites States communities surveyed before 9-11-01.
   - It is estimated that as many as **75,000 children** (10.5%) have symptoms consistent with **post-traumatic stress disorder**.
   - It is estimated that **190,000** children (including those who have PTSD) have symptoms of one or more of the **other measured psychiatric disorders**.
   - It is estimated that **16,000** (5%) children in grades 9-12 have **alcohol abuse** to such an extent that it impairs their daily functioning.

2. **Mental health impacts are observed citywide.** The prevalence of disorders is elevated all over the city, effects not being limited to Ground Zero schools:
   - Many children not exposed to the attack physically were **exposed to other stressors resulting from the attack,** such as having to flee to safety or having difficulty getting home.
   - One out of nine children (11%) citywide had a **family member** exposed to the World Trade Center attack.
   - Nearly two-thirds of all NYC public school children (grades 4-12) report experiencing one or more potentially traumatic events *prior to* 9/11 that could increase their risk for mental health problems (particularly PTSD) resulting from the World Trade Center attack.

3. **Factors that place children at higher risk for PTSD (and potentially other mental health problems as well) following the 9/11 attacks include:**
   - Younger age (being in 4th or 5th grade rather than middle or high school);
   - Personal physical exposure to the attack or stressors resulting from the attack;
   - Having a family member exposed to the attack;
   - Exposure to other traumatic events *before* 9/11;
   - Being female; and,
   - Being of Hispanic or "mixed/other" ethnicity.

4. **Possible factors that may have contributed to the resilience of the children in Ground Zero schools**, as evidenced by lower rates of PTSD than might be expected, include:
   - **High levels of social support** – Ground Zero schools received high levels of City services and grass roots community support to help them cope with the stress of the World Trade Center attacks.
   - **Demographic factors** – some may confer greater protective effects (e.g., students in Ground Zero schools may have a higher than average SES).
   - **Lower than average rates of prior exposure to community violence and trauma.**

FURTHER ANALYSES OF EXISTING DATA

This report presents an initial analysis of an unusually comprehensive and rich body of data. Additional analyses are being conducted of the existing data in order to:

- Further identify factors that may place students at high risk for mental health disorders and impairment.
- Identify sub-groups at high risk for specific mental health disorders and impairment.
- Investigate the ameliorative role of teachers, school, school staff, mental health services and other support post 9/11.
- Analyze the distribution of disorders and impairment according to grade, location, ethnic group, etc.

SUGGESTIONS FOR ADDITIONAL ASSESSMENTS

We suggest supplementing the present study with additional surveys to provide a more complete picture of the mental health needs of New York City school children, as well as teachers and staff in recovering from the World Trade Center attacks. These are:

- Survey children in K-3, utilizing sound methodological principles, to determine effects of 9/11 in younger children, who appear to be more affected, at least by PTSD, than the older children.
- Conduct a study with the same methodology in September/October 2002 to examine persistence of mental health symptoms and impairment in grades 4-12.
- Survey teachers and other school personnel to assess how the Board of Education can better meet their needs post 9/11 and to identify ways to augment preparedness for any possible future disasters.
- Survey school mental health service providers (counselors, psychologists, social workers, etc.) to assess how best to meet their needs (training, available referral options, etc.).

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